Technology Offer

Intelligent, Robotic-based System for Additive Manufacturing

KEYWORDS: Additive-Manufacturing; DED – Direct Energy Deposition; Intelligent Additive-Manufacturing Systems; LMD – Laser Metal Deposition; Manufacturing Systems; Robotic-based Additive; WAAM – Wire-Arc Additive-Manufacturing.

New Intelligent, Robotic-based System for Additive Manufacturing is a multi-robotic system designed for additive-manufacturing of metals using Direct Energy Deposition techniques. The system is composed by 3 sub-systems: a) A robotic-based Laser-Metal Deposition (LMD) system; b) A robotic-based wire-arc additive manufacturing system; and c) A subtractive robot-based system, that also includes features capable of 3D scanning and 3D reconstruction.

Robotic Arms

The invention is based on the novel idea of printing the designed part directly from the CAD station, having all the underlying process completely automatic. It also includes simulation features, in real time, adds mixed reality for user-machine interface, and explores the digital-twin concept, i.e., the system has a twin that behaves exactly as the real one. Consequently, the twin is used to setup, printing test, etc., before proceeding with the actual printing process.

The software that enables all these features is also part of this invention. It is design on cloud-based distributed programming, robot code generation (using a generic programming language) and TCP/IP connections to allow the system to include new features with time (as they become available). Consequently, the invention here presented is also designated as a development platform.

ADVANTAGES	APPLICATIONS
• Reduction of at least 20% in the production time. • Reduction of at least 25% in the production cost and improved manufacturing quality for straightforward designs and 50% for intricate designs. • Improving resource efficiency by at least 50%, by reducing the use of raw materials & energy consumption. • Developing a manufacturing for production flexibility by implementing high-level programming (HLP) and autonomous operations. • Developing and integrating a feedback and quality control mechanism in the platform, which uses real-time robotic vision and multi-sensorial systems. • Bridging the technological knowledge gap in this type of hybrid manufacturing operations in terms of interoperability, CAD interfacing systems, materials technology and process cognition. • Developing and exploring the disruptive innovation as a low capital investment solution suitable for SMEs.	• Additive-manufacturing of metals using Direct Energy Deposition techniques. • Manufacturing and metal processing. • Metallic components applying advanced processing technologies. • Platform for intelligent fabrication of complex parts and components based on modern materials. • WAAM – Wire-Arc Additive-Manufacturing. • LMD – Laser Metal Deposition. • DED – Direct Energy Deposition. • Intelligent additive-manufacturing systems. • Robotic-based additive-manufacturing systems.

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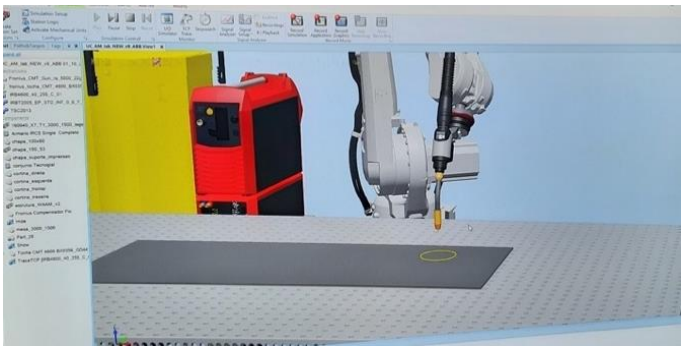

Digital Twin

Sample

VIDEO (QR Code or YouTube):

STAGE OF DEVELOPMENT: TRL 3

IPR LEGAL STATUS: Patent Pending n° PCT/IB2021/059963 filed on 28/10/2021.

OWNERSHIP: The rights to the technology are held by the University of Coimbra and 3D Components (Norway).

COLLABORATION SOUGHT: The University of Coimbra is seeking commercial partners interested in further developing the technology under a collaboration and license agreement or acquiring the existing rights.

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